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RESEARCH ARTICLE

REVISED **Twittering About Research: A Case Study of the World's First Twitter Poster Competition [version 3; referees: 3 approved]**Edward P. Randviir¹, Samuel M. Illingworth¹, Matthew J. Baker², Matthew Cude³,
Craig E. Banks¹¹Faculty of Science and Engineering, School of Science and the Environment, Division of Chemistry and Environmental Science, Manchester Metropolitan University, Manchester, UK²WestCHEM, Department of Pure and Applied Chemistry, Technology and Innovation Centre, University of Strathclyde, Glasgow, UK³Royal Society of Chemistry, Cambridge, UK**v3** **First published:** 14 Sep 2015, 4:798 (doi: [10.12688/f1000research.6992.1](https://doi.org/10.12688/f1000research.6992.1))
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Latest published: 20 Jun 2016, 4:798 (doi: [10.12688/f1000research.6992.3](https://doi.org/10.12688/f1000research.6992.3))**Abstract**

The Royal Society of Chemistry held, to our knowledge, the world's first Twitter conference at 9am on February 5th, 2015. The conference was a Twitter-only conference, allowing researchers to upload academic posters as tweets, replacing a physical meeting. This paper reports the details of the event and discusses the outcomes, such as the potential for the use of social media to enhance scientific communication at conferences. In particular, the present work argues that social media outlets such as Twitter broaden audiences, speed up communication, and force clearer and more concise descriptions of a researcher's work. The benefits of poster presentations are also discussed in terms of potential knowledge exchange and networking. This paper serves as a proof-of-concept approach for improving both the public opinion of the poster, and the enhancement of the poster through an innovative online format that some may feel more comfortable with, compared to face-to-face communication.

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14 Sep 2015

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report

- 1 Graham Scott**, University of Hull UK
- 2 Durhane Wong-Rieger**, Canadian Organization for Rare Disorders Canada
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REVISED Amendments from Version 2

This new version was published to correct a typographical error in the name of one of the authors. No other changes have been made.

See referee reports

Introduction

An academic conference should be a symposium where academics can report, share, discuss their work, and exchange ideas through a variety of different communication methods. A typical academic conference may consist of several oral presentations, including those from keynote or plenary speakers, in addition to a number of workshops, which offer a more interactive method of delivery. There is also the research poster, a somewhat maligned and misunderstood entity that in some instances feels like an afterthought. However, it could be argued that if knowledge exchange is the fundamental purpose of a conference, which it is, then posters and workshops are far more valuable than oral presentations (Rowe & Ilic, 2009); in which case, are posters being unfairly discredited?

The “all eyes on one” style of oral presentations is extremely limiting in terms of opportunities for the speaker to interact personally with members of the audience. Even in the post-talk questions, time constraints mean that not all questions can be asked, whilst some participants may be unable to comfortably relay their points to the author in that particular environment. Aside from this, the less intimidating nature of poster sessions may be preferable to a larger percentage of researchers, which might explain why the poster presentation saw large increases in the 1990s (Moule *et al.*, 1998).

A poster session is an extended period of academic knowledge exchange. Exhibitors normally stand by their poster and explain their research and findings to passing delegates, inspiring some form of discussion as a dialogue or perhaps in a group. Therefore, it makes sense poster sessions should provide more frequent opportunities for academics to exchange knowledge and create networks. The format of a poster session should theoretically allow for open, informal, and comfortable academic discussion regarding the work presented. Many researchers will have experienced instances of such academic exchanges taking place; yet it is not a form of communication that has been formally investigated in any great detail, but for contributions from Dubois Betty (1985) and Shalom (1993), who independently suggest that the poster presentation was a genre struggling for definition some 20 years ago; the feeling is unfortunately similar within scientific disciplines today. However, it has also been shown that students presenting posters on sensitive topics found that the format of the poster session put them more at ease (Rush *et al.*, 1995). Such an observation would suggest that the poster acts as a message board and focal point for presenters, with sensitive topics such as sexuality made easier to discuss by using posters as a facilitator. This facilitatory role can be extended to other less taboo-orientated subjects and, in principle, the

poster could help to facilitate learning amongst researchers, especially those in the early stages of their careers who may be less confident when presenting their research, compared to other, more experienced colleagues.

Despite many efforts by academics to report good poster guidelines (see e.g. Erren & Bourne, 2007; Hess *et al.*, 2009; Moore *et al.*, 2001; Shelledy, 2004; Taggart & Arslanian, 2000), the ideal poster presentation is often absent from poster sessions. Many posters are either poorly designed, or simply pinned to boards and left to stagnate, leaving any observant or enthusiastic researchers with unanswered questions. Even if a poster manages to attract a delegate, the content must be written in a concise, clear, and jargon-free manner to inspire intrigue. Poor written communication can be as detrimental to the message as the oral communication blunders brought about by an ill-prepared delivery.

It therefore comes as no surprise that some organisations have attempted to reimagine the poster. One specific example of this comes from the European Geosciences Union (EGU), who use a concept called PICO (Presenting Interactive Content) to diversify the knowledge exchange process. The general idea of PICO is for researchers to orally advertise their work in a two-minute flash presentation, in order to encourage the audience to later join them at interactive touchscreen slides, where they can engage with the author personally, in a format similar to the traditional poster session (European Geosciences Union, 2015). Such a form of engagement will no doubt enhance the learning and knowledge exchange experience for the researcher.

With any conference, there are always academics wishing to participate, but who are unable to because of travel and funding restrictions. For some researchers, these restrictions can be detrimental for the dissemination of their research, and can ultimately have a negative effect on their career progression. To combat this, some organisations, like the American Geophysical Union (AGU), have piloted a virtual poster showcase, encouraging researchers to participate at conferences virtually through a digital link. This obviates the requirement for travel, and therefore extra funding for travel purposes. Furthermore, posters are becoming an ever more acceptable route into publication, *via* academic journals such as in *F1000Research*, which publishes posters and slides alongside more traditional articles, as a means of reference-worthy academic literature.

Another potential alternative is the use of social media to encourage poster engagement, and this route will form the focus of this paper. The ubiquity of social media is responsible for many of the social behaviours and patterns that have emerged as a result of online communication, and given the power of social media, it could potentially be harnessed to help ensure posters are more greatly discussed, thereby helping to improve ideas and knowledge exchange between academics. This paper presents findings from the world's first Twitter poster conference, organised by the Royal Society of Chemistry, and discusses the potential impact of social media upon the academic poster.

Materials and methods

Conference organisation

The Analytical Science Twitter Poster Conference (ASTPC) was organised by the Royal Society of Chemistry (RSC) journals *Analyst*, *Analytical Methods* and *Journal of Analytical Atomic Spectroscopy* (JAAS). The ASTPC took place from 9am on 5th February 2015 to 9am on the 6th February 2015, giving researchers a period of 24 hours to tweet pictures of their poster using the hashtag #RSCAnalyticalPoster. The aim of the ASTPC was to create an opportunity for participants to showcase their research, meet new people, share ideas and learn about some of the latest developments in different areas of analytical science. The conference was open to anyone working in any area of analytical science whose research topic was within the scope of *Analyst*, *Analytical Methods*, or *JAAS*.

Data production

Participants were encouraged to tweet their work, and to be available to answer any questions that interested academics (or indeed members of the general public) might have about their research. There were also prizes for the best Twitter poster, as judged by the scientific committee, with remuneration in the form of an iPod and RSC book vouchers. Furthermore, unlike a regular conference that charges fees to participate, this event was entirely free, and had no registration process other than an email to the journal to verify identity. A scientific committee consisting of 12 academics associated with the RSC were heavily involved in asking questions, generating discussions, and judging posters. Further information regarding the event can be found on the journal's official blog (<http://blogs.rsc.org/an/2014/12/19/rscanalyticalposter/>). We have no way of knowing whether the competitive element skewed the participation of this conference, but feel that at most scientific conferences there are prizes awarded for the best posters, so in this regard assume that the competitive element does not increase nor decrease participation.

This study was carried out according to the British Educational Research Association's (BERA) ethical guidelines for educational research, with all of the data in this study fully anonymised. All work was also carried out according to the terms of use as indicated by Twitter's policies.

Measurement of Twitter activity

The participants that took part in the ASTPC are now assessed in terms of the number of tweets, area of the world from which the tweet was sent, total number of followers, and potential viewing audience for the tweets. All data is sourced from an online data collection program, available at <http://www.followthehashtag.com>. The data sample was taken over a period of 63 days, from 9am on 19th December 2014 to 9am on 20th February 2015. The data was collected from such an early date because this is when the initial announcement of the hashtag was made and promotion of the event began, however the vast majority of tweets were sent during the 24-hour window of the competition itself. Data collection stopped shortly after the prize winners were announced. Only tweets with the hashtag #RSCAnalyticalPoster were considered for the analysis, and so any figures reported here are most likely an underestimate, precluding any tweets for which the hashtag was absent. All reported times are in Greenwich Meantime.

Results and discussion

Dataset 1. Raw data for 'Twittering About Research: A Case Study of the World's First Twitter Poster Competition'

<http://dx.doi.org/10.5256/f1000research.6992.d101516>

Data have been de-identified.

Figure 1 depicts a world map with the locations of persons that contributed to the ASTPC. Over 80 posters were submitted from Argentina, Australia, Brazil, Canada, Ireland, Italy, Mauritius, the UK, and the USA, with the highest number of contributors coming from European countries. From the diversity shown in **Figure 1**, it can be inferred that social media can be used to improve the accessibility of the poster by making it freely accessible across the world in a matter of minutes. This further presents opportunities for researchers to exchange comments in the form of tweets, a format that is designed to be both clear and concise. Such communiqués encourage researchers to think more directly about their research, as they must communicate their point in 140 characters or less. This concise form of communication could help both students and academics to communicate more effectively, particularly students who sometimes struggle to differentiate between description and analysis (Chanock, 2000).

Table 1 presents the statistics that were published following the ASTPC. During the designated time period, over 1700 tweets were sent with the hashtag #RSCAnalyticalPoster, originating from 378 different contributors. Each participant contributed 4.59 tweets on average to the discussion, with the total number of followers for each person that tweeted amounting to over 380,000. On average, every poster potentially received in excess of 4200 views from several areas across the world, based upon the total impressions divided by the number of contributors (see **Figure 1**). This figure assumes that every impression was knowingly observed, but this is obviously unlikely.

Figure 2 displays a tweet and reach timeline that illustrates the frequency of activity across the 63 days of data collection. It is evident that there are two major zones of activity, as one would largely expect: the first when the conference was officially held, and the second when the prize winners were announced. The biggest reach and number of tweets was observed during the main event, followed by the prize announcements. **Figure 2** also demonstrates that the majority of the tweets took place during the ASTPC itself, relating to the scientific posters rather than to advertising and promotion of the conference.

Given the nature of a Twitter discussion, it is perhaps more useful to present data relating to the number of contributions that users made as a whole, rather than as an average. **Figure 3** depicts the individual contributions by author, and it is apparent that over half of the tweeters made only one contribution to the competition (200 users). More encouragingly, over 20% of contributors tweeted five or more times, and almost 10% of the contributors tweeted more than ten times. Indeed, the latter statistic infers that at least some useful exchanges were being made, even if it is difficult to

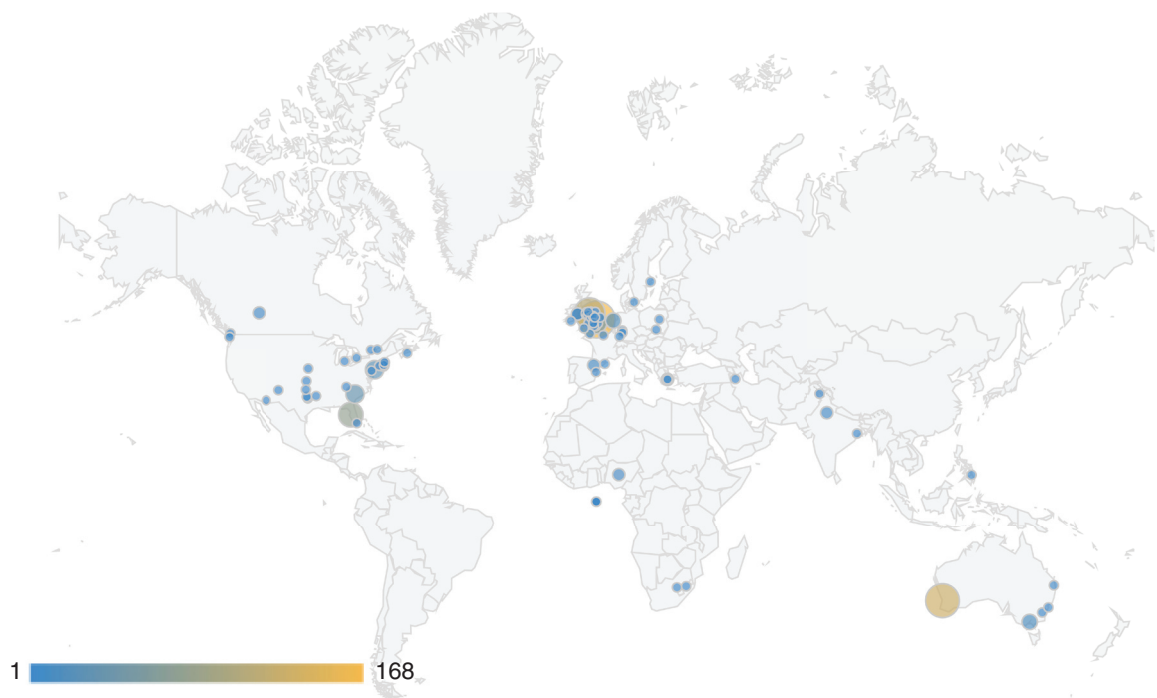


Figure 1. World map depicting the locations of participants in the ASTPC. Yellow points indicate multiple contributions, whilst blue data points indicate singular or near-singular contributions. Reproduced from data reports obtained from the website <http://www.followthehashtag.com>.

Table 1. Data obtained from the ASTPC.

Total tweets	1,734
Total audience (sum of followers)	381.233
Contributors (no. of unique Twitter users)	378
Measured time	63 days (19/12/15 to 20/02/15)
Total impressions*	1,594,269
Impressions per audience	4.18
Tweets per contributor	4.59
Tweets per day	27.5

Total tweets - the total number of tweets which included #RSCAnalyticalPoster, this includes retweets.

Total audience - the number of people who may have seen #RSCAnalyticalPoster in their Twitter feed. Calculated using the sum of followers from each contributor.

Contributors - number of unique Twitter accounts that used #RSCAnalyticalPoster.

Total impressions - the sum of contributor followers multiplied by the number tweets in which a contributor used #RSCAnalyticalPoster.

*Impressions are defined as the number of times a tweet is "served" in a Twitter timeline or search result.

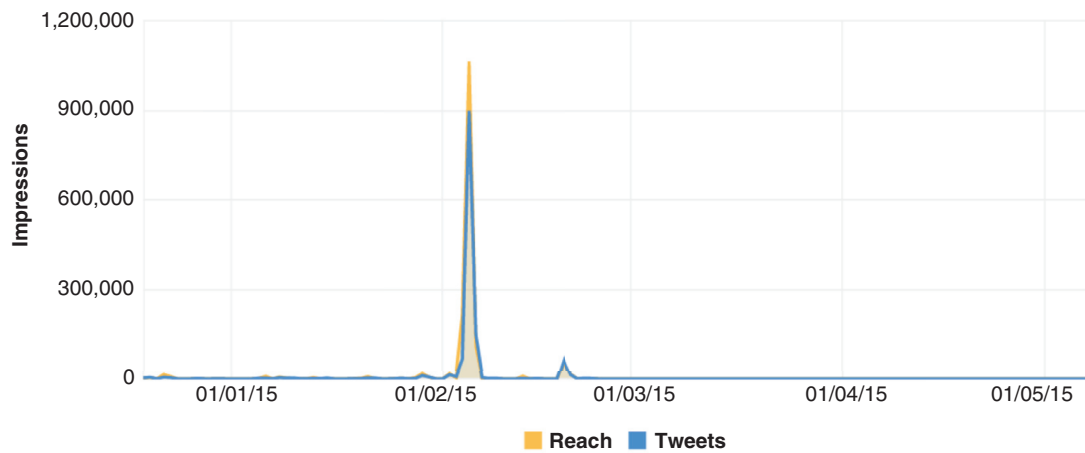


Figure 2. Number of Twitter impressions as a function of time, expressed both as tweets and reach*; reproduced from data reports obtained from the website <http://www.followthehashtag.com>. *Reach is defined as the number of observers of the tweet, based upon the number of followers of the user and the followers of any participants, responses, or retweets.

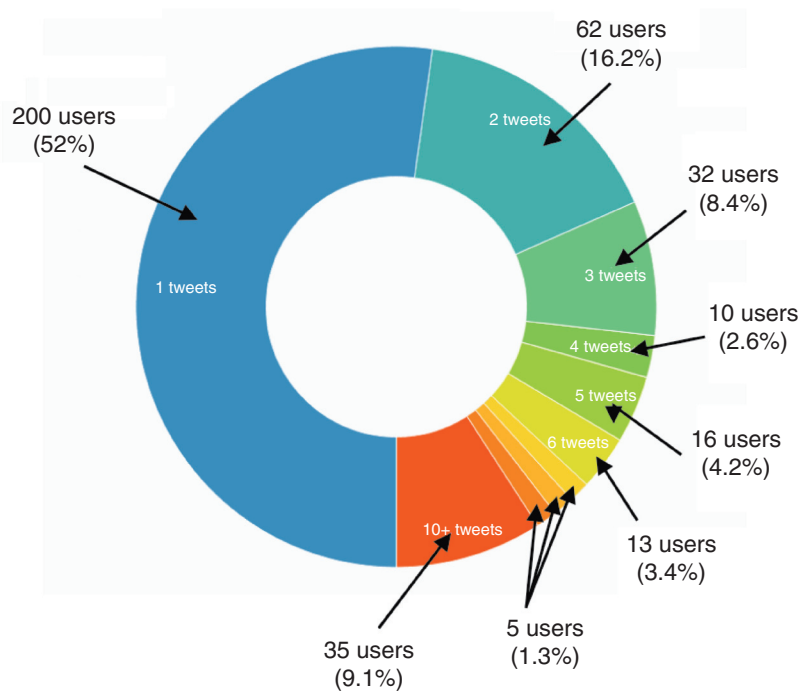


Figure 3. Illustration of the number of tweets sent by individuals; blue = 1 tweet; red = 10+ tweets. Reproduced from data reports obtained from the website <http://www.followthehashtag.com>.

gauge from such data how successful the exchanges may have been. The overall reach of each individual is difficult to estimate from such a dataset. One contributor may have contributed ten tweets to the discussion that has 300 people contributing, for example, yet only have ten followers, giving an overall reach value of around 310 people. Conversely, one person may have 1000 followers yet only contribute one tweet, yet their reach would be around 1300 people for one tweet alone. Therefore, it is fair to assume that Twitter can have a larger impact if the user has more followers, regardless of the number of contributions. This is one area that will be useful for further investigation, insofar as number of exchanges within one single conversation, number of tweets in that exchange, the relation of the interactions to the work presented (or indeed if it was just friendly chat), and the possibility of other collaborators engaging in dialogue over social media. This is currently beyond the scope of this work, but will be the subject of future investigations.

Another important piece of information relates to the gender distribution at the Twitter conference. According to the RSC membership department, 27.7% of their members are female and 72.3% male, representing an uneven distribution of members by gender. **Figure 4** displays the contributions of the ASTPC by gender, with 25.6% of contributions made by females and 74.4% by males. The fact that there is no significant difference between the RSC's overall membership and the contributors at this event shows that the social media format is not conducive to stimulation of more or less average contributions based upon the gender of the participant. The level of participation in terms of registrants was different to this, however, as 59.6% of the registrants were female. Therefore, whilst a large proportion of females were willing to engage with the competition (a significantly higher proportion than would be expected based on the RSC membership), the discussions appeared to be dominated by male contributors.

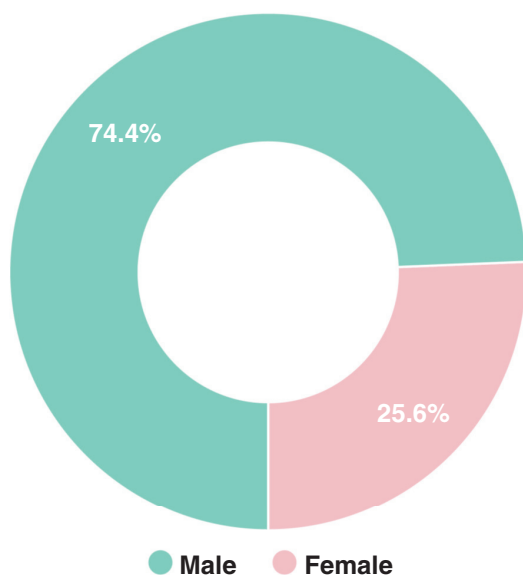


Figure 4. Gender distribution of the ASTPC contributions; reproduced from data reports obtained from the website <http://www.followthehashtag.com>.

The ASTPC was organised as a free event to encourage the sharing and exchange of knowledge through the use of social media. This pilot scheme saw a potential Twitter audience of over a quarter of a million people, demonstrating that posters can quite easily be shared using Twitter, to potentially reach thousands of times more people than they could at even the largest of international scientific conferences. Every day millions of people across the world access Twitter, new Twitter connections are being made, and opinion and discussion is stimulated as a result, while the introduction of hashtags has only served to group discussions together and augment the potential reach of a niche discussion. Even without an organised hashtag or event, a poster can have a larger potential audience than it would at a conference, where the audience will, at the very most, be a few hundred people. The number of useful exchanges between participants is less easy to enumerate, as one cannot quantify the level of interaction between academics in a given poster session and compare it to the number of tweets. A face-to-face conversation about a poster that is in front of two researchers will no doubt be more fulfilling in terms of knowledge exchange, because the conversation is not limited to a few characters. In the Twitter conference, there was an average of 4.5 tweets per person, suggesting that the level of academic discussion was somewhat limited. However, this is not to say that knowledge was not exchanged, but simply that the discussion part of the ASTPC may have been shorter than that of a standard poster session at a conference. This does not account for exchanges that may have been made in private, via emails or direct messaging facilities on Twitter.

As a concept, the Twitter poster conference has some definite advantages over a more traditional poster format, with the data analysed in this study supporting the notion that it is an extremely useful way of broadening the reach and potential audience of a poster. Another advantage is the ease of knowledge exchange for those who lack the confidence or interpersonal skills required for efficient face-to-face communications. It is also apparent that Twitter can decrease the cost of the poster to the researcher because it does not need to be carried as supplementary luggage during air travel; it also avoids potentially exorbitant printing fees at conferences for those who have lost or previously been unable to print their poster. Furthermore, the carbon footprint of a Twitter-only conference is extremely low (unquantified), whereas an international conference will exhibit a substantial carbon footprint, mainly due to air travel. Research by MMU (unpublished report, Jonathan Davies and Professor Callum Thomas) has recently found that an international conference of 178 delegates resulted in the equivalent of 177 tonnes of CO₂ being produced, the majority of which came from the 1.25 million kilometres of air travel required for delegates to travel to the conference.

The nature of Twitter means that more in-depth forms of communication are limited through online exchanges, which could be seen as a disadvantage of the format. However, after the initial exchanges the delegate has the opportunity to extend any interactions further. This can be achieved by the exchange of emails, phone numbers, and Skype IDs for example, or in private messaging facilities over Twitter, meaning that more in-depth chats about the research in question can still be facilitated. Future Twitter conferences should incorporate a feedback device for participants (presenters or otherwise) to understand what benefits the format has to the participant and whether they would participate again, with or without the

element of competition. The lack of interpersonal communication is disadvantageous, but should not detract researchers from a Twitter conference. It could be used alongside the traditional poster session, or as a separate entity of its own if a researcher is unable, or prefers not, to travel. Given Twitter's recent foray into video streaming, the concept could also be adapted to include oral communications, in which researchers could tweet short video vignettes of their work, or even use [Periscope](#) to live-stream the entire presentation. The Twitter format could also potentially be used as a hybrid with the PICO concept discussed in the introduction.

In specific relation to the RSC, the results presented here indicate that whilst Twitter could be used as a tool to address the gender inequality, more needs to be done to encourage female participants to participate in the active Twitter discussions.

Conclusions

The world's first Twitter conference could be considered a success in terms of potential audience, ease of knowledge exchange and lack of travel requirement. The conference reached out to many researchers across the world, and created an opportunity for participants to share their work not only with academics, but also with other interested parties such as writers, industries, friends and family, and even policy makers. Over 80 posters were tweeted with the hashtag #RSCAnalyticalPoster, reaching an audience potentially as large as 375,000 people, and the format of a Twitter poster conference has the potential to allow for research to be shared more quickly and cheaply, and in a more environmentally friendly manner. Despite some potential issues relating to prolonged exchanges, there is no doubt that the hybridisation of the academic conference and social media is something that could and should be seen more regularly in the future. We expect the use of social media to significantly expand scientific conferences due to the advantages identified above, and also to be utilised alongside conferences where physical participation occurs. The benefits of social media can help

researchers organise their poster viewings at large conferences, for example future ACS conferences, helping to potentially improve the poster session experience for all participating researchers. Such an improvement in engagement will enhance scientific communication and knowledge exchange, ultimately leading to more successful conferences. Future investigations will focus specifically upon detailed Twitter interactions in such an academic context and investigate whether the interactions can be classified as "meaningful", in order to establish the true impact of a social media only conference.

Data availability

F1000Research: Dataset 1. Raw data for 'Twittering About Research: A Case Study of the World's First Twitter Poster Competition', [10.5256/f1000research.6992.d101516](https://doi.org/10.5256/f1000research.6992.d101516) (Randviir *et al.*, 2015).

All data is also available publicly by searching for the hashtag "#RSCAnalyticalPoster" on [FollowtheHashtag](#).

Author contributions

All authors have contributed to this article equally.

Competing interests

The authors declare that there are no competing interests, either financial or otherwise.

Grant information

The author(s) declared that no grants were involved in supporting this work.

Acknowledgements

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Referee Report 07 January 2016

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Graham Scott

School of Biological, Biomedical, and Environmental Sciences, University of Hull, Hull, UK

I am content that the authors have addressed the points made.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Referee Report 31 December 2015

doi:[10.5256/f1000research.8186.r11775](https://doi.org/10.5256/f1000research.8186.r11775)



Michael Bales

Weill Cornell Medical College, New York, NY, USA

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Version 1

Referee Report 15 December 2015

doi:[10.5256/f1000research.7529.r11359](https://doi.org/10.5256/f1000research.7529.r11359)



Michael Bales

Weill Cornell Medical College, New York, NY, USA

The authors describe an academic conference and poster competition that occurred online in February 2015. Researchers were invited to share their work via Twitter in the form of an academic poster during a specified window of time on the day of the conference. The authors compare and contrast the online

conference with poster sessions at traditional academic conferences, identifying several advantages and disadvantages.

The article is well-written and serves as a good contribution to a growing body of work focusing on the changing modalities of scholarship and academic collaboration.

Several minor comments:

In the description for Table 1, the authors state that "on average, every poster potentially received in excess of 4500 views..." So that this caption can stand on its own, it would be helpful to clarify why the word "potentially" is used in this case.

In Figure 2 there one line for "Reach" and another for "Tweets", but the Y-axis is labeled "Impressions". Given that readers may be expecting a second Y-axis, the caption for Figure 2 should be sufficient to explain these three concepts.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Author Response 17 Dec 2015

Craig Banks, Manchester Metropolitan University, UK

We thank the reviewer for their comments and have endeavored to respond appropriately.

- The word "potentially" is used because we feel that there is no way that each poster had over 4200 views - the figure derives from the number of impressions divided by the total contributors, and assumes that every impression is knowingly observed. We have included this in the manuscript.
- The caption in Figure 2 has been defined more appropriately.

Competing Interests: No competing interests were disclosed.No competing interests were disclosed.

Referee Report 10 December 2015

doi:10.5256/f1000research.7529.r11113



Durhane Wong-Rieger

Canadian Organization for Rare Disorders, Toronto, ON, Canada

The concept and successful execution of this "experiment" makes it worth publishing. The data collected supports the premise that sharing a poster through a dedicated # will attract participants. However, some of the other concerns raised about the limitations of more traditional research poster sessions do not seem to be addressed. It is not clear why this was conducted as a competition and whether there would

have been the same level of participation without this element. So, the level of engagement might have been biased by a factor not usual in a poster session. It would have been very useful to have a "qualitative" content analysis of the tweets, or at least a sample of tweets to understand what was exchanged in the messages. This would add to understanding of the potential value of a Twitter-fest for scientific exchange. At least an analysis of the scope or "build" of discussion would be useful. How many exchanges were two, three or four exchanges? How many exchanges were builds on a core comment or additions to an initial exchange?

It may also have been beneficial to have a discussion as to the implications of the countries participating.

The conclusions of success based on "ease of knowledge exchange, lack of travel requirement, and reduction in carbon footprint" are somewhat questionable, given that these are the qualities of social media (especially Twitter) and so do not reflect on the success or value of this activity.

It may have been useful to solicit some feedback from participants, including the presenters, as to how they felt about the experience, the quality of the exchange, and the interest in doing again.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Author Response 14 Dec 2015

Craig Banks, Manchester Metropolitan University, UK

We thank the reviewer for providing an insightful review that will not only help improve the manuscript, but will also affect our future work.

- While we understand the reviewer's thought regarding the competitive element, we feel that most scientific conferences of this nature offer prizes for the best posters. With this in mind, we feel that the competitive element is no different to other conferences and assume that the participation does not change based upon this. We have noted this in the experimental section.
- The referee makes an excellent point regarding the nature of exchanges. We feel that with the information we have collected, we cannot extract enough quality data to report within this paper, but future work will focus more on a detailed analysis of Twitter interactions and develop a model for the level of meaning in each interaction. We have pointed this out within the updated manuscript in the conclusion, and have also discussed in the text that we feel further detail regarding exchanges would be useful.
- We agree that a feedback method should have been incorporated and this will be included in future works. The discussion section has been changed slightly to reflect the fact that this was an opportunity missed.
- We have removed the conclusion regarding lack of travel and carbon footprint, but remain optimistic that Twitter improves ease of knowledge exchange, if not directly then indirectly.

Competing Interests: No competing interests were disclosed.No competing interests were disclosed.

Referee Report 21 September 2015

doi:[10.5256/f1000research.7529.r10299](https://doi.org/10.5256/f1000research.7529.r10299)



Graham Scott

School of Biological, Biomedical, and Environmental Sciences, University of Hull, Hull, UK

This is an interesting paper that describes and evaluates a Twitter poster conference. The authors have clearly highlighted the potential reach that Twitter provides scientists wishing to engage others with their work and the ways in which Twitter as a medium has distinct advantages over traditional face to face interaction. In doing so this paper provides a useful starting point for a discussion about the use of social media as a conference format.

The authors acknowledge the limitations of twitter (e.g. limited ability to have an in depth discussion) but from the presented data they are unable to discuss this in any detail. In my opinion this is an area that should be investigated further. As an initial foray into the field this is a (very necessary) descriptive rather than investigative piece. In order that I might fully evaluate the value of the model I would have like to have more information about the broader themes of the tweets themselves – what proportion of them asked/answered a relevant question? How many were simply an indication of approval or an acknowledgement of participation in the virtual meeting etc. I don't think that this information needs to be added to the current paper (it makes a valuable initial contribution) but I would encourage the authors to follow this work with such an analysis if that is possible.

There is one minor change that I think would increase the initial readability of the paper. On first reading I found myself confused about the nature of the conference, perhaps revealing a prejudice based on prior experience and pre-conception I assumed that the Twitter poster conference was an adjunct to a physical meeting rather than a stand alone event. It may help readers to avoid this mistake if the authors explained that more clearly in the abstract?

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Author Response 14 Dec 2015

Craig Banks, Manchester Metropolitan University, UK

We thank the referee for their insightful comments and feel that they are of benefit to the manuscript both now and in the future.

- We are in agreement that this area should be investigated further, and have included some information as to how we will extend this work in the future, specifically relating to the nature

of Twitter exchanges and in developing a level of meaning based upon the information within exchanges.

- The referee makes a valid point regarding the ambiguity surrounded this event as a standalone conference. The abstract has been changed to reflect the nature of the conference to make this less confusing.

Competing Interests: No competing interests were disclosed.

Discuss this Article

Version 1

Reader Comment 18 Sep 2015

Nicholas Rowe, University of Lapland, Finland

I analysed an earlier conference of its 'cousin', the American Geophysical Union (2013 Fall Meeting). There were 27 subject areas, hosted over a 5 day meeting. Just looking at the first of these (Atmospheric Sciences), it had 176 sessions with 4419 presentations (3654 posters, 765 oral, 9 virtual & 25 virtual on demand only). As a delegate who might be interested in this area (not to mention any of the 26 remaining subject areas) it must be asked how you could possibly manage such a mass of information in the confines of the current conference setting?

PICO presentations do increase visibility at the conference, but it still limited to the time the presenter is available at, what is in effect, their 'e-poster'. A 2 minute presentation sounds short, but if 100 posters are presented by PICO, this is over 3 hours of presentation. Even a gap of 30 seconds between presenters can lengthen this considerably, so although this is a good idea in principle, it remains to be seen how conference organisers can fit it into a scheduled session & what actual benefit results.

The authors view that 'a poster session is an extended period of academic knowledge exchange', but the current confines of space & time do not promote or facilitate this. They say that 'posters are becoming an ever more acceptable route into publication, via academic journals such as in F1000Research, which publishes posters and slides alongside more traditional articles, as a means of reference-worthy academic literature'. There is however no consensus on what 'published' means to different people, what the objectives of 'publication' are, nor how its legal definitions can be applied to posters. If we assume the objective of publication is to pass our work into the public domain, then does a body of X thousand delegates constitute this as having been achieved, or despite its size, does it represent a mere fraction of those around the world who could benefit from the information we have to offer?

The idea of 'tweets' involves brief, short burst communications. For any in-depth discussion to occur, there would have to be a reciprocal number of tweets, yet only a small number of delegates had 10 or more, and most had only a single tweet that suggests they put their poster 'out there' but received no response. They say that 'the overall reach of each individual is difficult to estimate from such a dataset. One contributor may have contributed ten tweets to the discussion that has 300 people contributing, for example, yet only

have ten followers, giving an overall reach value of around 310 people. Conversely, one person may have 1000 followers yet only contribute one tweet, yet their reach would be around 1300 people for one tweet alone. Therefore, it is fair to assume that Twitter can have a larger impact if the user has more followers, regardless of the number of contributions'.

Like other social media, some people have a lot of followers, friends etc, whilst others keep their groups more meaningful. For example, I have 100s of connections on LinkedIn because I use it to disseminate awareness of my business. My ResearchGate profile has relatively few people I follow, because I only follow those whose work interests me or who are part of my academic institution. As for Facebook I deliberately keep friends to those who are immediately known to me.

The study claims that 'this pilot scheme saw a potential Twitter audience of over a quarter of a million people, demonstrating that posters can quite easily be shared using Twitter, to potentially reach thousands of times more people than they could at even the largest of international scientific conferences'.

IMO, what is important is that the degree of interaction (not potential) suggests that effective communication was not demonstrated. They acknowledge this by saying that there was an 'average of 4.5 tweets per person, suggesting that the level of academic discussion was somewhat limited'. Yes, we can reach wider audiences with Twitter, but it is a short-burst communication medium (often 'fire & forget'). I think that social media and communication technology have a big part to play in the future of poster knowledge dissemination & researcher networking, but I am not convinced Twitter is equipped to providing any meaningful solution to the current problem of meaningfully disseminating research to the wide body of people who might benefit from it.

Competing Interests: No competing interests were disclosed.
